

**Apparatus and process for producing a tabular bag**

The present invention relates to an apparatus to bend a first and a second cross seal of the bag made of a flexible packing material towards the sidewall. The present  
5 invention further relates to a packaging machine comprising the inventive apparatus and a method for producing a bag made of a flexible packaging material.

Food stuff, especially sweets and snacks are nowadays merchandised in packaging items made of a plastic material. These packaging items must be manufactured cost-  
10 efficiently and must be appealing in order to present the packaged product appropriately. In this respect, it is desireable to produce cuboid-shaped bags with cross seals that are oriented towards the sidewalls.

It is therefore the problem of the present invention to provide an apparatus to  
15 produce bags made of a flexible packaging material with cross seals which are bent towards the sidewall of the bag.

The problem is solved by an apparatus according to claim 1. Preferred embodiments of the inventive apparatus are claimed in the subclaims 2-4.

20 It was totally surprising and could not have been expected by a person skilled in the art that the inventive apparatus allows to produce bags with cross seals bent towards the sidewall of the bag. The inventive apparatus is produced and operated easily and cost-efficiently.

25 According to the present invention, the apparatus comprises first and second means to orientate the first and the second cross seal towards the sidewall of the bag.

These means can be any means known by a person skilled in the art which bends the cross seal toward the sidewall. Preferably, these bending means are one or more  
30 nozzles which blows gas, preferably air against one side of the cross seals in order to bend them to the sidewall. In another preferred embodiment of the present invention, the bending means are mechanical means like a plate.

Furthermore, the inventive apparatus comprises turning means in order to turn the bag, preferably upside down. Before the bag is turned, it is fixed at the turning means. Consequently, in a preferred embodiment of the present invention, the turning mean comprises fixing means, for example clamping jaws or means to produce a vacuum in order to fix the bag at the turning means. After the bag has been fixed at the turning means, the turning mean rotate preferably by 180 °.

In a preferred embodiment of the present invention, the turning means comprises a plane, preferably a plate, on which the bag after the lower cross seal has been bend, is dropped. Due to the impetus and due to the weight of the packaged item, the bend cross seals and/or the side folds of the bag are further shaped; i. e. the shape of a cuboid is improved.

Another subject matter of the present invention is a packaging machine, preferably a vertical type packing machine for producing tubular bags from a foil web which comprises the inventive apparatus to bend the first and the second cross seal.

It was surprising and could not have been expected for a person skilled in the art that the inventive packaging machine is produced and operated easily and cost-efficiently. The inventive packaging machine allows to produce packaging bags which have almost a cuboid shape.

Another subject matter of the present invention is a method to produce a bag made of a flexible packaging material and filled with packaging item whereas the bag is turned while it is produced.

It could not have been expected and was totally surprising for a person skilled in the art that the inventive method is carried out easily. With the inventive method, it is possible to produce packaging bags with almost cuboid shape.

In a preferred embodiment of the inventive method, two cross seals of the bag are oriented towards the sidewall of the bag.

Preferably, the shape of the bag is stabilized by the packaging item.

In another preferred embodiment of the present invention, the cross seals are bent towards the sidewall of the bag by the weight of the packaging item.

5 Another subject matter of the present invention is a method to produce a bag made of a flexible material filled with a packaging item and comprising a side wall, whereas the weight of the packaging item is used to support the shaping of at least 2 sides of the side wall.

10 The inventions are now described in greater details hereinafter in connections with drawings 1-3 which illustrate exemplary embodiments of the present invention. The illustrations are applicable to the inventive apparatus, the inventive packaging machines and the inventive methods. The drawings show:

15 **Figure 1** a cuboid bag.

**Figure 2** a scheme of a vertical form fill packaging machine.

**Figure 3** an embodiment of the inventive apparatus.

20 **Figure 1** shows a tubular cuboid shape bag which can be filled with a packaging item (not depicted). The bag comprises a sidewall 5 and a top area 22 and a bottom area 23. The bag has four side folds 19, 29, 21, 24 whereby two side folds, e.g. sidefolds 19, 29 and sidefolds 21, 24 are sealed together by cross seals 1, 2, respectively. At 25 the top and at the bottom, the bag comprises welded edges 18 in order to improve the cuboid form. The longitudinal seal 17 extends or is aligned with one of the welded edges 18. It can be seen that the cross seal 2 has already been bent towards the sidewall of the bag, especially towards the sidefolds, while cross seal 1 is still more or less perpendicular with respect to the sidefolds

30 In **Figure 2**, a vertical form fills a seal packaging machine; i. e. a vertical flow rapper is systematically depicted, which allows for example the production of the bag according to Figure 1. A web of a foil 9, especially a sealable plastic film 9, is supplied by rolls (not shown) of film material. The foil 9 web is then shaped by the

shaping shoulder 16 to provide a rather tubular form to the material. According to the present invention, "tubular form" of the bags or of the foil means any cross-sectional form including a circular form or another form, and especially a rectangular or generally a polygonal form. The vertical flow wrapper further comprises longitudinal 5 sealing means 27 in order to produce the longitudinal seal 17 of the bag and edge sealing means 30 in order to manufacture edge seals 18. The person skilled in the art understands that the edge seals are optional. After applying the longitudinal seal and optionally the edge seals, the bottom of the bag 2 can be formed by a special bottom forming means 13. The bottom forming means especially comprise means to 10 produce the sidefolds 19, 21, 24 and 29. Finally, cross seals 1, 2, extending perpendicularly (or transversally) to the direction of flow of the foil, are applied, especially by means of cross-seal jaws 14. The cross seal jaws 14 further comprises cutting means which separate the completed bags. Thus the cross seal applied is the bottom seal 2 for one bag and the top seal 1 the next bag.

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**Figure 3** shows the inventive apparatus which is arranged under the cross seal 14 according to Figure 2. The packaging item is positioned above the nozzles 4. The nozzles 4 are directed towards the side of lower cross seal 2 of the packaging item according to Figure 1. Air is ejected through the nozzles 4 for a very short period of 20 time, i. e. some milliseconds in order bend the cross seal 2 towards the sidewall, while the upper cross seal 1 of the bag according to Figure 1 is produced and the bag 3 is cut from the foil web 9. After the bag 3 has been separated from the foil web, it drops into the gap 25 and hits plate 8. Since the lower seal 2 is already bent by the nozzles 4 and due to the impetus and the weight of the packaged items, cross seal 2 25 is further bent towards the sidewall. Additionally, the side folds 21 and 24 are further allined towards the lower side of the packaging item, so that the cuboid-shape of the bag is improved. Since the cross seal 2 still has an elevated temperature which is caused by the cross seal process, the cross seal 2 is deformed plastically. The bag looks now as shown in figure 1; i.e. cross seal 1 has not yet been bent. After the 30 packaging item 3 has hit plate 8, jaws 12 are moved towards each other to fix the bag 3. After the bag 3 has been fixed, the turntable 7 rotates counter-clockwise by 180 ° The person skilled in the art understands that turntable 7 needs not rotate back and forth, but can always rotate in one direction. At the lower end 28, the inventive apparatus further comprises another set of nozzles 6 which can eject air and which

are directed against the side of cross seal 1 after the bag has been turned upside down by the turntable 7. The nozzles 6 or any other means to bend the cross seals need not be at the lower end, but can be anywhere in the vicinity of the inventive apparatus. Due to the impact of the air, the upper cross seal 1, which still has an 5 elevated temperature, is also oriented towards the sidewall. The orientation of cross seal 1 can be in the same direction as cross seal 2 or asymmetrical. After the orientation of the cross seal has been taken place, the jaws 12 are moved apart, so that the bag 3 falls into channel 26 and from there on a plate (not depicted) which further forms the cross seal 1 as well as the side folds 19 and 23 in order to improve 10 the cuboid shape of the bag 3. Since the seal 1 is already bent by the nozzles 4 and due to the impetus and the weight of the packaged items, cross seal 1 is further bent towards the sidewall. The a. m. plate can be designed as a jotting table. Finally, the turntable rotates clockwise by 180° and the process starts again.

**Reference signs**

- 1,2      cross seal
- 5      3      bag
- 4,6      gas ejection nozzles
- 7      turning mean
- 8      plate
- 9      film
- 10      10,11      one side of the bag
- 11      12      jaws
- 12      13      means to produce the side fold
- 13      14      cross seal
- 14      15      filling tube
- 15      16      forming shoulder
- 16      17      longitudinal seal
- 17      18      corner seal
- 18      19, 21      side folds
- 19      20      direction of flow
- 20      22      top area
- 21      23      bottom area
- 22      24, 29      side folds
- 23      25      gap
- 24      26      channel
- 25      27      longitudinal sealing means
- 26      28      lower end
- 27      30      corner sealing means